DUBININ, N.P.; SHCHERBAKOV, V.K.; SHAVEL'ZON, R.A.

Natural mutation process with uninhibited cytogenetic effect of natural mutagens. Genetika no.3:27-34 S '65.
(MIRA 18:12)

1. Institut biologicheskoy fiziki AN SSSR, Moskva. Submitted June 3, 1965.

DUBININ, N.P.; DUBININA, L.G.; TARASOV, V.A.

Mechanism of chemical protection against the radiation injury of human chromosomes in a tissue culture. Genetika no.5:68-81 N '65. (MIRA 19:1)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

L 01285-67 EWT(m)
ACC NR: AP5027234 SOURCE CODE: UR/0020/65/164/006/1405/1406

AUTHOR: Dubinin, N. P. (Corresponding member AN SSSR); Dubinina, L. G. 31 B

ORG: Institute of Biological Physics, AN SSSR (Institut biologicheskoy fiziki AN SSSR)

TITLE: Chemical protection from the genetic effect of small doses of ionizing radiation 19

SOURCE: AN SSSR. Doklady, v. 164, no. 6, 1965, 1405-1406

TOPIC TAGS: radiation protection, biologic mutation, genetics, serotonin, streptomycin, experiment animal, ionizing radiation biologic effect, x ray radiation biologic effect

ABSTRACT: The problem of protection associated with the genetic effect when under the influence of small doses of ionizing radiation is a very urgent one. Since the genetic effect does not have a threshold, it can be the cause of different hereditary deviations in future generations regardless of the size of the dose. Experiments were conducted with human tissue-cell cultures to study the protective influence of S-aminoethylisothiourone (AET)($9 \cdot 10^{-5}$ M concentration), serotonin ($1 \cdot 10^{-8}$ M), and streptomycin (1 unit/ml). The γ-radiation doses used were 25, 50, and 100 r. Thirty minutes before irradiation the above mentioned protective substances were fed into the medium. The authors took the value 100 - k/o·100 as an indicator of protection,

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"Experimental alteration of the number of chromosome pairs in Drosophila Melanogaster," Institute of Experimental Biology (Dir: acad. N. K. Koltsov), Moscow. (p. 833) by Dubinin, N. P.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. V, 1936, No. 5

DUBININ, N. P.

"A new type of position effect." Institute of Experimental Biology (Dir: acad. N. K. Koltsov), Moscow. (p. 851) by Dubinin, N. P.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. V, 1936, No. 5

DUBININ, N. P.

"A new case of Bar mutation." Department of Genetics (Chief: N. P. Dubinin), Institute of Experimental Biology (Dir: Acad. N. K. Koltsov), Ministry of Health, Moscow (p. 881) by Dubinin, N. P.; and Goldat, S. Yu.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. V, 1936, No. 5

DUBININ, N. P.

"Genetic constitution and Geno-dynamics of wild populations of Drosolphila Melanogaster." Chair of Genetics, All-Union Zootechnical Institute of Fur-Bearing Animals, NK 3, Balashikha, and the Department of Genetics, Institute of Experimental Biology, Ministry of Health, Moscow. (p. 939) by Dubinin, N. P.; Gentner, M. A.; Demidova, Z. A.; and Dyachkova, L. I.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. V, 1936, No. 6

DUBININ, N. P.

"Aberrant polymorphism in Drosophila Fasciati Meig." (Sun. -Melanogaster Meig.) Department of Genetics, Institute of Experimental Biology, Ministry of Health; and Chair of Genetics, All-Union Zootechnical Institute of Fur-Bearing Animals NK 3 (?Ministry of ??) (p. 311) by Dubinin, N. P., Romashov, D. P., Gentner, M. A., Demidova, Z. A.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. VI, 1937, No. 2

DUBININ, N. P.

"The development of translocation in drosophila melanogaster." (p. 845) Department of Genetics (Chief: Prof. N. P. Dubinin) Institute of Experimental Biology (Director: Academician N. K. Koltsov), Moscow, by Kursanov,B. A.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. VI, 1937, No. 4

DUBININ, N. P.

"Intraspecific chromosome variability." (p. 1007) Institute of Experimental Biology, Ministry of Health; and the All-Union Institute of Fur Bearing Animals NKJ (? Ministry of ??), Moscow. by Dubinin, N. P., Sokolov, N. N., Tinyakov, G. G.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. VI, 1937, Nos. 5-6

DUBININ, N. P.

"Caryotype Phylogeny in Connection with the Role played by Linear Repetitions." (p. 295)
by Dubinin, N. P., and Volotov, E. N.

SO: Journal of General Biology, (Zhurnal Obshchey Biologii), 1940, Vol. I, No. 2

DUBININ, N. P.

"Darwinism and Genetics of Populations" (p. 276) by Dubinin, N. P.

SO: Advances in Modern Biology, (Uspekhi Sovremennoi Biologii), Vol. XIII, No. 2, 1940

Chromosome Mutations in Populations as the Basis of Karotype Evolution

Doklady Akad Nauk SSSR, Vol 29, No 5-6, 1940

DUBININ, N. P.

"Integrating Factors of Evolution in the Light of Artificial Selection," published by the Dept. of Biological Sci., AS USSR

VAN 4/5-44

DUBININ, N. P. (Moscow)

"On the Inheritance of Biochemical Properties Which Influence the Flower Coloration" (p.341) by Dubinin, N. P.

SO: Advances in Modern Biology (Uspekhi Sovremennoi Biologii) Vol. XXI, No. 3, 1946

DUBININ, N. P.

Structural Variability of Chromosomes in Urban and Rural Populations

Doklady Akad Nauk SSSR, Vol 51, No 2, 1946

DUBININ, N. P.

Natural Selection and the Fertility Cycle in Populations of Drosophila Melanogaster

Doklady Akad Nauk SSSR, Vol 51, N o 4, 1946

DUBININ, N. P.

"Natural Selection in Experiments with Population Inversions," Dok. Akad. Nauk, Vol. 51, No. 9, 1946.

"Seasonal Cycle and Inversion Frequency in Populations," Dok. Akad. Nauk, Vol. 52, No. 1, 1946.

DUBININ, N. P., Inst Cytology, Histology and Embryology, Acad Sci USSR

Physiological Mutations in Populations

Izvestiya Akad Nauk SSSR, Ser Biol, No 4, 1947

DUBININ, N. P.

"On the evolution of mutability and its sources in natural populations" (p. 431) by N. P. Dubinin

SO: Advances in Modern Biology (Uspekhi Sovremonnoi Biologii) Vol. XXIII, No. 3, 1947 (May-June)

DUBININ, N. P.

"Migration and Inherent Selection in Experiment with Natural Populations," Dok. Akad. Nauk, SSSR, Nova. Ser., 55, No. 6, 1947. Corr. Mbr. Acad. Sci. USSR -47-

DUBININ, N. P., Gor Mor, Acad Sci USSR

Inversions in Confines of Ecological Breeds of Drosophila Funebris

Doklady Akad Nauk SSSR, Nova Ser, Vol 55, No 7m 1947

Ecology of the Town and Distribution of Inversions in the Drosophila Funebris

Doklady Akad Nauk SSSR, Nova Seriya, Vol 56, No 8, 1947

DUBININ, N. P. and Tinyakov, G. G.
Cor Mbr. Acad Sci USSR

Climate and Dispersion in Area of a Form of Drosophila Funebris F"

Doklady Akad Nauk SSSR, Nova Seriya, Vol 56, No 9, 1947

USSR/Medicine - Flies Oct 1947
Medicine - Heredity

"Genetics of Adaptive Aberrational Polymorphism in Drosophila Melanogaster," N. P. Dubinin, Corr Mem, Acad Sci USSR, 3½ pp

"Dok Akad Nauk SSSR, Nova Ser" Vol LVIII, No 2

Research on polymorphism in Drosophila revealed that in some cases of aberration, remarkable degree of hereditary development evident. Also showed that no Mendel's selectivity when flies possessing characteristics of aberration crossbred with normal or hybrid flies. Briefly describes the genetics and analysis of variations of this phenomenon. Submitted, 15 Jul 1947.

49754

DUBININ, N. P.

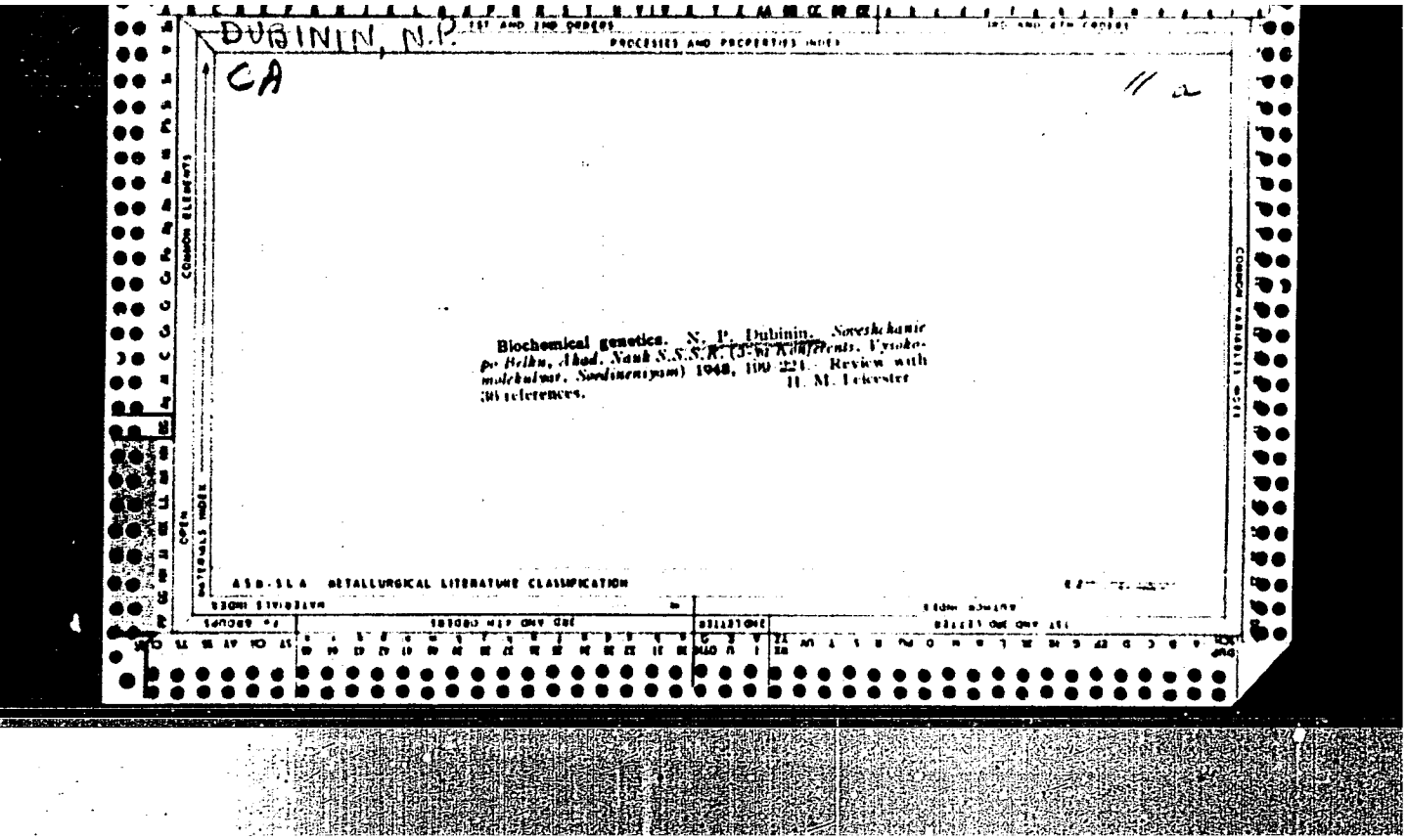
USSR/Medicine - Flies Dec 1947
Medicine - Heredity Mechanism

"Genetic Bases of Adaptive Polymerization and Its Significance in Evolution," N. P. Dubinin, Corr Mem, Acad Sci USSR, 3½ pp

"Dok Akad Nauk SSSR, Nova Ser" Vol LVIII, No 7

Studies on genetics of polymerization established fact that it is based on a complex heterogenous heredity, which has broad effect and important significance since it includes all Drosophila population. Submitted, 4 Oct 1947.

60T54


DUBININ, N.P.

CA

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Biochemical genetics. N. P. Dubinin. *Soveshchanie po Biokhu, Akad. Nauk S.S.S.R. (Trudy Soveshchanii. Vysshe-molekulyar. Soedinenivam)* 1948, 199-221. Review with 31 references. H. M. Leicester

A.S.T.I.A. METALLURGICAL LITERATURE CLASSIFICATION

USSR/Medicine - Heredity
Medicine - Evolution

May/Jun 48

"Experimental Study of Integration of Hereditary Systems in Processes of Evolution of Populations," N. P. Dubinin, Moscow, 42 pp

"Zhur Obshch Biol" Vol IX, No 3

Studies of Drosophila melanogaster. Treats subject under: (1) the problem; (2) additional venation and polymorphism and genetics of this feature in populations; (3) sexual dimorphism and seasonal cycle in additional venation in populations; (4) degree of satiation of populations by hereditary factors determining polymorphism in additional venation;

[redacted] 16/49T90

USSR/Medicine - Heredity (Contd) May/Jun 48

(5) selection and manifestation of additional venation in natural lines; (6) polygenous heredity as basis of genetics of additional venation in populations; (7) predominance of hereditary system of additional venation; (8) integration of hereditary system of additional venation in second chromosome; (9) discussion. Submitted 18 Jun 1947.

[redacted] 16/49T90

DUBININ, N. P. , Inst Cytology, Histology and Embryology, Acad Sci USSR

Seasonal Cycle and Inversion Frequency in Populations
SSSR
Doklady Acad Nauk, Vol 62 No 2, 1948

DUBININ, N. P.

PA 78T47

USSR/Medicine - Flies Jun 1948
Medicine - Heredity, Mechanism

"Genotypic Dependence of Increased Variability on the Border Area of the Habitat of the Species Drosophila Melanogaster," N. P. Dubinin, Corr Mem, Acad Sci USSR, V. V. Khvostova, 4 pp

"Dok Ak Nauk SSSR" Vol LX, No 8

Apply new theories of evolution to solve the problem of the factors of evolution on the basic genetic processes, especially those occurring in the main classes of species. Submitted 17 Apr 1948.

78T47

BARANOV,P.A.; DUBININ,N.P.; KHADZHINOV,M.I.

The problem of hybrid corn. Bot.zhur.40 no.4:481-507 Jl-Ag'55. (MLRA 8:11)
(Corn (Maize)) (Hybridization, Vegetable)

DUBININ, N.P.

Errors in the problem of the origin of species. Biul. MOIP, Otd. biol. 60 no.1:97-107 Ja-F '55. (MLRA 8:7)
(Origin of species) (Lysenko, Trofim Denisovich, 1898-)

DUBININ, N.P.

Control of heterosis by genetic methods as a basis for a substantial increase in the fertility of plants and animals. Biul. MOIP. Otd. biol. 60 no.2:109-116 Mr-Ap '55. (MLRA 8:7)
(Heterosis)

DUBININ, Nikolay Petrovich; TOROPANOVA, Tat'yana Aleksandrovna; SUKACHEV, V.N., akademik, redaktor; GLADKOV, N.A., doktor biologicheskikh nauk, redaktor; DEMENT'YEV, G.P., redaktor; POLIVANOVA, Ye.B., tekhnicheskiy redaktor.

[Birds of the Ural Valley forests; Parts 2 and 3] Ptitsy lesov doliny r. Ural; pts. 2 and 3. Moskva, Izd-vo Akademii nauk SSSR, 1956. 308 p. (Akademiia nauk SSSR. Institut lesa. Trudy, vol. 32) (MLRA 9:8)

1. Chlen-korrespondent Akademii nauk SSSR (for Dubinin)
(Ural Valley--Birds)

Dubinin, N.P.

B-5

USSR/General Biology - Genetics.

Abs Jour : Ref Zhur - Biol., No 4, 1958, 14405

Author : Dubinin, N.P.

Inst : -

Title : Physical and Chemical Bases of Inheritance.

Orig Pub : Biofizika, 1956, 1, No 8, 677-695

Abstract : A review of fundamental problems in contemporary genetics and genetic cytology advanced in the last few years as a result of broad experimental and theoretical studies in the field of physico-chemical structure, composition and reproduction of chromosomes, special studies of DNA structure and its reduplication, and the significance of DNA structure for specific protein cell synthesis. Comparing data of the last few years on the structure and function of DNA (Watson (?) and Krik (?) and others) with his own data on step-by-step allelomorphism (1929), the author develops a concept of the chromosome as an integral formation

Card 1/2

DUBININ, N.P.

USSR/General Division. General Problems. Philosophy. Methodology. A-1

Abs Jour: Referat Zh.-Biol., No 17, 1957, 72346

Author : N. P. Dubinin
Inst :
Title : Problems and Tasks of Radiation Genetics.

Orig Pub: Vest. AN SSSR, 1956, No 8, 22-23

Abstract: The possibility of ionizing radiation affecting human heredity must be taken into account when atomic energy is widely used. In contrast to radiation sickness, mutations may develop in the reproductive cells following any dosages of radiation, without necessarily influencing the radiated organisms. The author cites different estimates of the radiation dosages sufficient to double the spontaneous mutation process in man (usually assumed to be 10-12 r.) and of the results of induced mutation; he shows that the danger of genetic consequences of radiation is strongly increased because of an irregularity in the distribution of radioactivity

Card : 1/2 -2-

USSR / General Biology. Genetics. Genetics of Man. B-5

Abs Jour: Ref Zhur-Biol., No 18, 1958, 81089.

Author : Dubinin, N. P.
Inst : Not given.
Title : Ionizing Radiation and Heredity of Man.

Orig Pub: Izv. AN SSSR, Ser. biol., 1957, No 6, 743-755.

Abstract: Representations were set forth on the mechanism of X-ray effects and on the meaning of mutations that arise as a result of the action of radiation affecting heredity of the coming generations of man. It was underscored that, for man, practically all resulting mutations are harmful. Every increase in the quantity of radiation in the atmosphere produced an additional increase in the concentration of harmful mutations, and, consequently, brought to humanity irraparable

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USSR / General Biology. Genetics. Genetics of Man. B-5

Abs Jour: Ref Zhur-Biol., No 18, 81089.

Abstract: damage. Accounts were presented based on the factual increase in the quantity of ionizing radiation due to the utilization of atomic energy without appropriate means of protection, and on the results of nuclear experiments - that demonstrated how dangerous may be the consequences of this to humanity. It was emphasized that, from the point of view of contemporary radiogenetics, "permissible" doses of radiation for man do no exist. It was pointed out that, notwithstanding the great number of investigations which are dedicated to the questions of radiogenetics, the problem of the action of atomic radiation on reproduction cells of man remains the most pressing in radiobiological experiments.

Card 2/2

DUBININ, N.P.

Scientific discoveries and technical progress produced methods which revolutionized agriculture and livestock raising. Tekh. mol. 25 no.5: 35-36 My. '57. (MLRA 10:6)

1. Chlen-korrespondent Akademii nauk SSSR.
(Biochemistry) (Genetics)

DUBININ, N.P.

Radiation method in plant selection. Bot.zhur. 42 no.1:3-19 Ja '57.
(MLRA 10:2)

1. Institut biofiziki Akademii nauk SSSR, Moskva.
(Plants, Effect of radiation on)
(Plant breeding)

USSR / General Biology. Genetics. General Genetics. B-3

Abs Jour : Ref Zhur - Biol., No 14, 1958, No 61914

Author : Dubinin, N. P.
Inst : Moscow Society of Nature Study, Section of Biology.
Title : Contemporary Status of Heredity Problems.

Orig Pub : Byul. Mosk. o-va ispyt. prirody. Otd. biol., 1957, 62, No 2, 5-15

Abstract : This paper was read at the plenary conference of biological sections of the Moscow Society of Nature Study which took place on 10 December 1956. The most important directions within the development of contemporary genetics were expounded. Also, essential results of genetic experiments which have been carried out in the USSR and abroad were discussed. The extreme theoretical importance of studies which have clarified the role played by DNA [desoxyribonucleic acid] and RNA [ribonucleic acid] in processes of heredity was

Card 1/2

DUBININ, N.P.

DUBININ, N.P.

Some philosophical problems of modern genetics [with summary in English]. Biul.MOIP. Otd.biol. 62 no.5:11-17 S-O '57. (MIRA 10:11)
(GENETICS)

DUBININ, N. P.

"Ionizing Radiation and Heredity in Man"

paper scheduled but not presented at Intl. Congress on Radiation Research, 10-16 Aug 1958, Burlington, Vermont.

DUBININ, N.P.

Principal factors determining natural mutation [with summary in English].
Bot. zhur. 43 no.8:1093-1107 Ag '58. (MIRA 11:9)

1.Institut tsitologii i genetiki AN SSSR, Moskva.
(Botany--Variation)

AUTHOR: Dubinin, N. P., Corresponding Member, Academy of Sciences, USSR SOV/20-122-4-49/57

TITLE: Quantitative Relationship Between the Dose of Ionizing Radiations and Their Possible Harmful Effect on Heredity of Man (Kolichestvennaya zavisimost' mezhdu dozoy ioniziruyushchikh izlucheniy i ikh opasnost'yu dlya nasledstvennosti cheloveka)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 4, pp 713 - 715 (USSR)

ABSTRACT: The genetic effects, i.e. mutations in the sexual- and somatic cells are the only biological consequences of the radiation which are produced without having a threshold dose. This means that any dose, even as small as it may be, is able to cause genetic mutations the number of which is directly dependent on the dosage of radiation. The problem of the chronic effect of small doses is therefore one of the most important objects of the present radiation genetics of man. The mutations which are caused in the sexual cells of the irradiated parents will be expressed only in the coming

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generations of mankind. The genetic consequences, which are caused by somatic mutations and lead to the formation of malignant anaemiae and cancerous formations, will endanger the present as well as the coming human generations. This will, however, be the case only if the general uncontrolled radiation background (fon radiatsii) is increased. The test explosions of the H-bombs are at present the only factor which leads to such an increase. Data on the radiation genetics of mice (Ref 1) are used at present for the quantitative evaluation of the harmful effects of the radiation. The coefficients of the radiation mutability thus obtained are the basis of all calculations of the radiation danger for the heredity. However, the results of reference 2 are to a certain extent in contradiction to the opinion that the radiation mutability of mice is analogous to that of men. It was proved (Ref 2) that the frequency of the reconstruction of chromosomes in the germ-cells of monkeys is considerably higher in the case of the

action of 400 r, than of mice, and indeed about double. Thiy may be as well the case with man. The coefficient of the radiation mutability (mutabil'nost)(5.10^{-7}) suggested by the author has, however,no definitive character. The ratio between the radiation- and the natural mutability of man must be known, in order to evaluate in which number of hereditary diseases of a human population the effect of the one or other radiation dose would be expressed. This is confirmed by several compilations (Refs 3,4). The accuracy of the evaluation of the gene mutability of man is not high. Various opinions exist on the average natural mutability of man per gene. The comparison of the frequency of the mutations, which are caused by the ionizing radiation ($5\text{-}10^{-4}$), and the frequency of the natural mutation (muturovaniye)(5.10^{-6}), shows that the energy dose of 1 r amounts to a tenth of the natural mutation. In the case of a peaceful use of atomic energy, the radiation protection and a reasonable control may guarantee the security of the heredity of man.There are 8 references,

DUBININ, N.P.

21(4); 17(0) PHASE I BOOK EXPLOITATION SOV/2808

International Conference on the Peaceful Uses of Atomic Energy. 2d, Geneva, 1958

Doklady sovetskikh uchenykh; radiobiologiya i radiatsionnaya meditsina (Reports of Soviet Scientists; Radiobiology and Radiation Medicine) Moscow, Izd-vo Glav. upr. po ispol'zovaniyu atomnoy energii pri Sovete Ministrov SSSR, 1959. 429 p. 8,000 copies printed. (Series: Vtoraya Mezhdunarodnaya konferentsiya po mirnomu ispol'zovaniyu atomnoy energii. Trudy, tom 5)

General Ed.: A.V. Lebedinskiy, Corresponding Member, USSR Academy of Medical Sciences; Ed.: L.S. Shirokova; Tech. Ed.: Ye.I. Mazel'.

PURPOSE: This book is intended for physicians, scientists, and engineers as well as for professors and students at vtuzes where radiobiology and radiation medicine are taught.

COVERAGE: This is Volume 5 of a 6-volume set of reports delivered by Soviet scientists at the Second International Conference on the Peaceful Uses of Atomic Energy, held on September 1-13, 1958, in Geneva. Volume 5 contains 32 reports edited by Candidates of Medical Sciences S.V. Levinskiy and V.V. Sedov. The reports cover problems of the biological effects of ionizing radiation, future consequences of radiation in small doses, genetic effects of radiation, treatment of radiation sickness, uses of radioactive isotopes in medical and biological research, uses of atomic energy for diagnostic and therapeutic purposes, soil absorption of uranium fission products, their intake by plants, and their storage in plants and foodstuffs. References accompany each report.

Reports of Soviet Scientists (Cont.) SOV/2808

AVAILABLE: Library of Congress (QC770.I53)

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DUBININ, N. P.

"Radiation and Human Heredity."

Soviet Scientists Concerning the Dangers of Nuclear-Weapon Tests, p. 79, Publishing House of the Main Adminstration for the Use of Atomic Power, Council of Ministers USSR, Moscow 1959.

17(4) SOV/20-126-1-49/62

AUTHORS: Dubinin, N. P., Corresponding Member AS USSR, Sidorov, B. N., Sokolov, N. N.

TITLE: The Genetic Consequence of the Aftereffect of Visible Light (Geneticheskiy effekt posledeystviya vidimogo sveta)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 1, pp 179-182 (USSR)

ABSTRACT: The photodynamic process of visible light causes a great number of re-arrangements of chromosomes. The analysis of the after-effect of irradiated solutions of coloring matter is of great interest for the explanation of the nature of this phenomenon. The aftereffect mentioned, was found in the hemolysis (Refs 1-5): weak solutions of fluorescing colors showing no darkness reaction, can endanger erythrocytes after they have been exposed to light, while the effect itself takes place in darkness. The question arose, whether re-arrangements of chromosomes could be achieved through solutions treated in the described way. As test objects served the roots of onions treated in darkness with solutions of Rivanol or toluidine-blue which had been exposed to light before (Table 1). A remarkable increase of re-

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arrangements of chromosomes was noted in all experiments. The degree of the aftereffect can be considerably increased by certain additions (boric acid) (Table 2). This supports the idea that in this case the mutagenic effect of the coloring matter is related to some sort of long existing combinations which develop under the influence of light. These can neither be the effected molecules of coloring matter nor the active radicals OH and HO_2. Table 3 shows the results of additional experiments which were meant to show the consequence of the aftereffect at different moments after the exposition to light. As can be seen from this, the consequence of the aftereffect lasts 15 min but completely disappears after 30 min. The life of the mutagenic factor seems to be 15-20 min after the time which the dyestuff needs to penetrate into the root has been deducted. The authors give a survey of the work on the mutagenic effect of the irradiated medium on microorganisms (Refs 7-11). In reference 10 the conclusion is arrived at that the mutagenic effect of the medium treated with H_2O_2 or with u.-v.-rays is related to the development of organic peroxides. This is also proved in ref-

The Genetic Consequence of the Aftereffect of Visible Light

erences 12 and 13. The authors assume that in the case of an aftereffect of visible light, the mutagenic effect is related to peroxide products. The latter develop due to the addition of molecular oxygen to the color molecule. These are the so-called photo-oxydes, the existence of which has been chemically proved in the cases of certain dyestuffs (Ref 14). In this work the authors have proved at least three different mechanisms of the mutagenic effect of color molecules: a) The effect of active radicals (photodynamic effect), b) the effect of photo-oxides (aftereffect of irradiating color molecules with visible light), and c) probably a direct reaction of color molecules with the nuclein (darkness-reaction). There are 3 tables and 13 references, 2 of which are Soviet.

ASSOCIATION: Institut tsitologii i genetiki Sibirskogo otdeleniya Akademii nauk SSSR (Institute of Cytology and Genetics of the Sibir' Branch of the Academy of Sciences USSR)

SUBMITTED: February 25, 1959

17 (4), 17 (20)

AUTHORS: Dubinin, N. P., Corresponding Member, AS USSR, Sidorov, B. N., Sokolov, N. N. SOV/20-126-2-48/64

TITLE: Protection Mechanism Against Genetic Effects of Radiation (O mekhanizme zashchity ot geneticheskikh effektov radiatsii)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 2, pp 400-403 (USSR)

ABSTRACT: In numerous tests on the chemical protection of nuclei, against the photodynamic effects (Phd. E.), the authors have established a powerful protective of hyposulphite (Table 1). In a test with X-ray irradiation, however, the protective effect could not be observed (Table 2). One may say that the protective mechanism of hyposulphite by Phd. E. is not necessarily connected with the oxygen-neutralization. Previously (Ref 2) a certain similarity of the Phd. E. with the results of the water radiolysis through ionized radiation was indicated. Here also a free HO_2-radical is formed as end effect, although in another way. The tests, carried out by the authors, have shown that hyposulphite protects either, against the hydroperoxide-radical HO_2 or the HO_2-radical plays no

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essential part, or finally that a connection exists between the ionized, and the normal states of the oxygen molecules, whereby there is a difference in the protective effect of the hyposulphites against the Phd. E. on one hand and against the X-ray irradiation on the other. Thio-urea is effective against ionized radiation, but offers no protection to the chromosomes against Phd. E. (Table 3). One must admit that the protective effect of the thio-urea is not connected with the neutralization of the free HO_2-radical, if it arises by the X-ray action as well as with the Phd. E. Although this conclusion seems to contradict the current opinion about the role of the thio-urea in radiobiological effects, it may nevertheless be true (Ref 3). There is a connection between photodynamic activity and luminescence. Luminescent pigments are, as a rule, active, whereas the pigments which are not luminescent are, in this reaction inactive (Ref 3). Hence the authors became aware of the fact that hyposulphite extinguishes the luminescence. This is known to be in some way connected with the obstructing process of the photo-

reaction, and goes parallel to the latter process. The authors have tested, as protection against Phd. E. several luminescent extinguishers (KJ, KBr, hydroquinones) under the application of rivanol and methylene-blue (Table 4). M. I. Mekshenkov has verified the contrasting value of the authors' methylene-blue solution as a luminescence extinguisher. He obtained the following amount of quantum-yield (kvantovyy-vykhod): Hydroquinone 62, hyposulphite 78, KJ - 84, KBr - 86. As is seen by table 4, the degree of protective effect of these substances corresponds to their difference in luminescence extinguish. KJ and hyposulphite do not offer any protection against the results of X-ray irradiation to the chromosomes (Tables 2, 5). Those substances which protected against Phd. E. were ineffective against X-rays (thio-urea). The main test with germinated seeds of the onion (Allium cepa) and of Nigella damascena showed a greater resistance on the part of the latter against Phd. E. (Table 6) as well as against X-rays. Nigella was also more resistant than the onion against the chemical reaction of age and against factors which are brought about by the natural process of mutation. Such a distinction

Protection Mechanism Against Genetic Effects of Radiation SOV/20-126-2-48/64

is established here for the first time. The nature of the resistance remains unknown for the time being. Several opinions to its clarification have been offered. There are 6 tables and 7 references, 4 of which are Soviet.

ASSOCIATION: Institut tsitologii i genetiki Sibirskogo otdeleniya Akademii nauk SSSR (Institute for Zytology and Genetics of the Siberian Branch of the Academy of Sciences, USSR)

SUBMITTED: February 23, 1959

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30 (1), 17 (4)

AUTHORS: Dubinin, N. P. Corresponding Member AS USSR, Sidorov, B. N., Sokolov, N. N. SOV/20-128-1-46/58

TITLE: Genetic Effect of Free Radicals

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 1, pp 172-175 (USSR)

ABSTRACT: Considering that the experimental proof of the radiobiological effect of free radicals is of greatest importance for the whole theory of the primary radiation effect on living cells, the authors carried out the following experiments. Chromosome transformation in the cells of bulbs is caused by an influence of free radicals produced by a chemical process in the cell. The first experiment was carried out by introducing bivalent iron and hydrogen into the cell. It is known (Refs 21, 22) that OH- and HO_2 radicals develop under these conditions. The occurrence of OH and HO_2 radicals involves strongly oxidative properties of Fenton's reagent. In the first test series frequencies of chromosome transformations were investigated in five control series: 1.) Seeds not treated. 2.) Seeds treated with 0.001 M $FeSO_4$ solution; 3.) Seeds treated with 0.006 M or 0.01 M

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H_2O_2. 4.) Seeds treated with a solution of 0.001 M $FeSO_4$ and 0.006 M H_2O_2 immediately after the production of the mixture. 5.) The same - 15 minutes after the production of the mixture. Table 1 shows that the free radicals produced by a chemical process in the cell, have a strongly genetic effect. Figure 1 (insert sheet to page 73) shows photomicrographies of cells in which chromosome transformations were caused by free radicals chemically produced in the cell. Table 2 gives results of the second experiment. As can be seen, the free OH and HO_2 radicals produced in the cell by the reaction of ascorbic acid with hydrogen peroxide, and those produced under the influence of Fenton's reagent, are considerably effective in causing chromosome transformations. By transforming chromosomes it could be proved for the first time that free OH and HO_2 radicals have an effective influence on the structures of living cells. The problem regarding the intensity of the effect of free radicals under the influence of ionizing radiation on the cells, cannot be solved by experiments with chemically produced radicals. It is possible, however, to identify exactly the effect of the

chemical protection by extinguishing the effect of certain radicals. It will become possible to find a concrete relation between a direct and an indirect effect of radiation on genetic structures by defining the relation between the chemical protection against free radicals chemically produced in the cell, and against the effect of ionizing radiation. Besides it will be possible to approach in a new way the analysis of different radiosensitivity. Experiments in this connection are still going on. There are 2 tables and 24 references, 5 of which are Soviet.

ASSOCIATION: Institut biofiziki Akademii nauk SSSR (Institute of Biophysics of the Academy of Sciences, USSR)

SUBMITTED: April 8, 1959

PLOKHINSKIY, Nikolay Aleksandrovich; DUBININ, N.P., red.; DUBNIK, R.L., red.; MAZUROVA, A.F., tekhn.red.

[Analysis of variance] Dispersionnyi analiz. Pod red. N.P. Dubinina. Novosibirsk, Izd-vo Sibirskogo otd-niia AN SSSR, 1960. 121 p. (MIRA 13:6)

1. Chlen-korrespondent AN SSSR (for Dubinin).
(BIOMATHEMATICS)

DUBININ, N.P.; ARSEN'YEVA, M.A.

Human radiation radiation genetics. Itogi nauki: Biol. nauki no. 3:228-258 '60. (MIRA 13:10)
(RADIATION—PHYSIOLOGICAL EFFECT) (HUMAN GENETICS)

DUBININ, N.P.; KHVOSTOVA, V.V.; DELONE, E.L.

Ionizing radiations and plant breeding. Itogi nauki: Biol. nauki no. 3:292-323 '60. (MIRA 13:10)
(PLANTS, EFFECT OF RADIATION ON) (PLANT BREEDING)

81734
S/020/60/133/01/62/070
B011/B126

21.6300

AUTHORS: Dubinin, N. P., Corresponding Member AS USSR, Sidorov, B. N., Sokolov, N. N.

TITLE: Experimental Analysis of the Original Mechanism of the Effect of Radiation on the Cell Nucleus

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 1, pp. 221-224

TEXT: The primary effects of radiation are caused either by the energy which is absorbed within the molecules of the structure to be changed (direct effect), or by free radicals, which form in the solution as a result of water ionization (indirect effect). These criteria were, however, refuted by the proved effect of radiation on water-free polymers. The authors were able to analyze directly the rôle of direct and indirect radiation effects, since the genetic activity of the free radicals, which were produced chemically in the cell (Ref. 15), was proved. The authors wanted to discover the chemical protection against the OH-radicals, which

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Experimental Analysis of the Original Mechanism of the Effect of Radiation on the Cell Nucleus

forms on electron transmission in reductive systems. The use of the same protection against the ionizing radiation must extinguish that part of the protection which is activated by the effect of the radicals forming through the ionization of the H_2O molecules. The authors have proved a chemical protective action (Ref. 16) through hydroquinone, iodine ion, and other substances. But they were unable to characterize the chemical protective effect until they had chemically produced free radicals in the cell. The Fenton reaction takes place as follows:

$Fe^{2+} + H_2O_2 \longrightarrow Fe^{3+} + OH^- + OH$. The iodine- and bromine ions introduced into the small roots of onions suppress the genetic effect of both the Fenton reagent and the mixture of ascorbic acid with H_2O_2. The iodine ion does not shield the chromosomes against conversions (Table 1). The Fenton reagent is genetically more effective. Ascorbic acid alone, as acceptor of free radicals, is able to shield the chromosomes. The iodine ions raise the whole effect of the free radicals from the latter reaction (100%), and leave about half of the free radicals in the Fenton reaction unbound. The iodine ion binds on the one hand the free hydroxyl radicals

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Experimental Analysis of the Original Mechanism of the Effect of Radiation on the Cell Nucleus

S/020/60/133/01/62/070
B011/B126

in this reaction, and on the other hand raises the number of free radicals, converting divalent iron into trivalent. From their experiments the authors could not confirm the statements that the reaction of trivalent iron with H_2O_2 leads to the formation of a chromosome conversion. At the same time the mutation process can be initiated by the solution of trivalent iron with H_2O_2, which has no genetic effect (Table 4). Thio-urea shields the chromosomes against direct and indirect radiation effects (Table 5), whilst shielding them against the chemically produced free radicals. Thio-urea does not, however, shield against H_2O_2. In all cases the effect takes place inside the cell nucleus. Iodine ions and quinone shield the molecules at low concentrations (experiments by M. I. Mekshenkov). It follows from the results that the main effect during shielding against ionizing radiation is direct. The genetic effect of the radiation is predominantly bound up with the direct effect of the energy on the chromosomes. Finally the authors indicate promising directions for research. There are 6 tables and 33 references: 6 Soviet, 7 British, 19 US, and 1 German.

Card 3/4 3

Inst. Biophysics, AS USSR

4

BR

PHASE I BOOK EXPLOITATION SOV/5932

Dubinin, Nikolay Petrovich, Corresponding Member, Academy of Sciences USSR

Problemy radiatsionnoy genetiki (Problems in Radiation Genetics) Moscow, Gosatomizdat, 1961. 467 p. Errata slip inserted. 5000 copies printed.

Scientific Eds.: V.V. Khvostova and S.I. Shirokov; Ed.: Z.D. Andreyenko; Tech. Ed.: Ye.I. Mazel'.

PURPOSE: This book is intended primarily for scientists concerned with problems of nuclear energy and its applications in terrestrial and space engineering, biology, agriculture, and medicine. It may also be useful to specialists investigating the effects of radiation on astronauts.

COVERAGE: The author discusses major problems in radiation genetics, which cannot be considered apart from phenomena of the physical

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and chemical nature of heredity. A brief history of work in this field is given. The effects of radiation in the human, animal, and vegetable realms are described, and preventive measures against possible dangers are discussed. No personalities are mentioned. There are 886 references: 186 Soviet, 564 English, 97 German, 28 Swedish, 6 French, 3 Danish, 1 Italian, and 1 Dutch.

TABLE OF CONTENTS [Abridged]:

Problems in Radiation Genetics SOV/5932

AVAILABLE: Library of Congress

SUBJECT: Biology and Medicine

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RZ/wrc/bc
7-17-62

SIDOROV, B.N.; DUBININ, N.P.; SOKOLOV, N.N.

Experimental study of the role of free radicals and the direct effect in the primary mechanism of the radiation effect. Radiobiologiia 1 no.2:161-171 '61. (MIRA 14:7)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.
(RADICALS (CHEMISTRY))
(RADIATION—PHYSIOLOGICAL EFFECT)

DUBININ, N.P.

Experimental polyploidy as the method of the creation of new forms of plants by means of chemically directed heredity alteration. Zhur. VKHO 6 no.3:325-332 '61. (MIRA 14:6)

1. Chlen-korrespondent Akademii nauk SSSR.
(Polyploidy)

27499
3403/61/005/003/001/004
A051/A129

27.1220

AUTHOR: Dubinin, N.P., Corresponding Member of the USSR Academy of Sciences

TITLE: The nature of radiogenetic changes and the effect of ionizing radiations on human heredity

PERIODICAL: Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva im. D.I. Mendeleyeva, v. 6, no. 3, 1961, 332 - 336

TEXT: The author deals with the nature of the effects of ionizing radiation on live organisms, primarily on humans, by reviewing the latest theories presented throughout the world. The author claims that the problem can best be solved in the light of an evaluation of the radiation hazards to human heredity. Radiation genetics and radiation-cytology investigate the nature of the effect of radiation on the nuclear and cytoplasmic structures of the cell. Experiments on the action of radiation on DNA molecules showed that breaks of the main chains occur in these molecules along the ether or carbon-oxygen bond, deamination with the release of ammonia, opening of the rings of heterocyclic bases, break of the glucoside bonds with the formation of inorganic phosphates. An

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The nature of radiogenetic changes ...

analysis of the consequences of primary and secondary radiation on the DNA molecules indicated certain differences. The well-known effect of ionizing radiation on the cell is described. The interaction of atomic hydrogen with molecular oxygen brings about the following reaction: $H + O_2 \rightarrow HO_2$. The free radicals exist on the average for 2×10^{-7} sec. The existence of a secondary radiation effect has been proven experimentally in low concentrations of ferment solutions, nucleic acids, proteins, various other polymers, dyes and other substances. The discovery of the dilution "effect" of chemical protection against effects of radiation and the "oxygen effect" have created a basis for the concept of the major significance of secondary radiation. It was concluded that the secondary effect of radiation, when irradiating cell structures and substances, was very great. The problems of analysis of primary radiation, i.e., the interaction of molecules with biological structures and radiation energy, are dealt with. The primary and the secondary radiation can be modified within a wide range by changing the physical, chemical, biochemical and physiological conditions during and after irradiation. Although the theory of the secondary radiation effect on the chromosomes is widely acclaimed, the very fact of the genetic effectiveness of the radicals OH· and HO_2 has not been proven. The Fenton reagent leads to the formation of OH· radicals in the following manner:

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The nature of radiogenetic changes ...

$Fe^{2+} + H_2O_2 \longrightarrow Fe^{3} + OH^- + OH^{\cdot}$. Experiments with chromosomes in cell nuclei of onion root and other plants showed that neither the bi-valent iron, nor the ascorbic acid have an independent mutagenic effect. The experiments further showed that free radicals have a genetic effect and it has been established that the Fenton reagent and possibly other reducing systems are powerful mutagenic factors, the use of which may prove interesting in producing mutations in subjects with a practical value. Experiments determining the degree of effectiveness of previously prepared mixtures of $FeSO_4$ or ascorbic acid and H_2O_2 can help to analyze the mechanism of mutagenic action of reducing systems. Experiments have shown that previously prepared mixtures are ineffective, which can be expected on the basis of the nature of free radicals. Thus, the genetic effect of free radicals has the nature of instantaneous and localized action. As to localizing the effect of free radicals, the principles of the secondary influence of ionizing radiations and radicals, obtained chemically are probably the same. Experiments:
$OH^{\cdot} + I^- \longrightarrow OH^- + I$ (1), $HO_2^{\cdot} + I^- + H_2O \longrightarrow OH^- + H_2O_2 + I^{\cdot}$ (2), indicated that the iodine and bromine ions introduced into the cells when processing the roots over a period of ten minutes with a 0.06 M solution of KI and KBr suppress the genetic effect both of the Fenton reagent as well as that of the reaction of the

The nature of radiogenetic changes ...

ascorbic acid with hydrogen peroxide. It was established that hyposulfate, hydroquinone, quinone and thiourea protect the chromosomes from damaging effects of radicals, produced chemically. The OH· and HO_2 radicals occurring in the radiolysis of water damage the molecules in the solutions. It is known that the bromine ions capturing these radicals have a protective effect. Further, it was shown that the iodine and bromine ions protect molecules of methylene blue and DNA from radiation in solutions with low concentrations. Experiments using the iodine and bromine ions indicated that these protect chromosomes from the action of X-rays. There is no difference between the various concentrations of the iodine. Substances, such as thiourea, cystein, etc., can protect both from primary and secondary radiation. Experiments have further shown that iodine, bromine and other ions acting in a similar way, protect chromosomes from free radicals obtained chemically whereby they have no capturing protective effect on the genetic effect of radiation. This proves that the genetic effect of radiation is mainly associated with the primary action of energy quanta of radiation on chromosomes. The development of the theory of the secondary action after the discovery of the oxygen effect and other modifying factors has led to the wide-spread view of the major significance of products of radiolysis of water in causing genetic effects of radiation. The primary action of absorbed energy

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The nature of radiogenetic changes ...

does not always lead to a new chemical structure in one or the other locus of the chromosome or to its break, as was previously assumed due to the target theory. The protective effect of a number of substances acting after the irradiation can be better understood in the light of the data available on the after-effects of oxygen on the potentially-changed cell structures. In a previous work by the author (Ref. 2: DAN SSSR, v. 128, p. 1 (1959)), it was proven that radicals do not play an important capturing role in causing genetic effects at the given quantity of free radicals and the microgeometry, according to which they are distributed in the cell, in the given radiolysis of the water and the presence of its own protective substances, capturing the radicals. It is pointed out that even a minute radiation dose can cause chemical changes in the chromosomes. The frequency of mutation depends on the dose, but any small dose can cause the corresponding quantity of mutation. Since each individual mutation is steadfastly maintained, the important conclusion is made that the effect of small doses should be summed up. This conclusion and also the fact that the frequency of genic mutations is in direct relationship to the dose of the ionizing radiations has been proven experimentally without a doubt. The problem of studying the action of small doses arises. Based on the data that the average frequency of natural mutation is equal to 5×10^{-6} per gene in one generation, N.

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The nature of radiogenetic changes ...

P. Dubinin, taking into account the radiogenetic sensitivity of monkeys, concluded that the dose per roentgen causes one tenth of the natural mutation. The effect of a dose equal to 10 roentgen doubles the natural rate of mutation, is significant for radiation genetics of man. The Soviet delegation has recommended that a dose of ten roentgen accepted by the Scientific Committee on Radiation of the United Nations be adopted as the possible dose of ionizing radiations doubling the frequency of the natural mutational processes in man. Data obtained in experiments of radiation effect on cells in humans on tissue cultures have shown that the concept of 10 roentgens as a dose doubling the frequency of natural human mutation can be considered as based on direct experimentation. It is pointed out that the genetic material changes under the effects of radiation not only in the embryo but in any somatic cell of the organism. Data listed in the article indicate that any small dose causes radiation mutations, but this does not mean that these small doses are dangerous to heredity for some people. This danger increases only in the case where larger portions of the population are subject to living in an area with an elevated background. The new data obtained in the studies on radiation genetics showed that the chronic effect of small doses of ionizing radiation, when affecting the entire world population, is hazardous to the health of future generations and can be the cause of malig-

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The nature of radiogenetic changes ...

nant growths in the new irradiated generation. There are 1 table and 96 references: 20 Soviet-bloc and 76 non-Soviet-bloc. The references to the four most recent English-language publications read as follows: C. E. Ford et.al., Lancet, 709 (1959); P. A. Jakobs, I. A. Strong, Nature, 183, 302 (1959); C. E. Ford et.a., Lancet, 711 (1959); J. H. Tjio, T. T. Puck, A. Robinson, Proc. Nat. Acad. Sci., 45, 1008 (1959).

ASSOCIATION: AN SSSR (AS USSR)

Card 7/8

ZOZ, N.N.; DUBININ, N.P.

Chemical induction of mutations in wheat. Dokl. AN SSSR 137 no.3: 704-705 Mr '61. (MIRA 14:2)

1. Institut biologicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Dubinin).
(Wheat) (Plants, Effect of ethylenimine on)

27.1220

25324

S/020/61/138/005/024/025
B103/B220

AUTHORS: Dubinin, N. P., Corresponding Member AS USSR, Kerkis, Yu. Ya., and Lebedeva, L. I.

TITLE: Experimental analysis of the influence of radiation on cell nuclei in a culture of human embryonic tissue

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 5, 1961, 1212-1215

TEXT: The authors first compared natural mutagenesis with that due to radiation in cultures of human embryonic tissue and then the data obtained with the process of mutation in the living organism. The aim of the study was to establish the tolerance of small doses of ionizing radiation produced by nuclear tests and peaceful use of atomic energy for the present and future generations. Although differences exist between the modifications in nuclei of tissue cultures and those of a living organism, it is possible to obtain data on the effect of small doses of radiation by the above-mentioned method; moreover, those doses may be determined, which double the natural frequency of mutations. Since the colchicine method (M. A. Bender, Ref. 2: Science, 126, 974 (1957);

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T. T. Puck, Ref. 3: Proc. Nat. Acad. Sci., 44, No. 8, 772 (1958); T. C. Hsu, C. M. Pomerat, Ref. 4: J. Hereditas, 44, 23 (1953)) is too cumbrous the authors recorded the occurrence of bridges and fragments in anaphases and telophases of the mitosis. Test no. 1. The authors used tissues of 1.5-2-month-old embryos which had been obtained clinically by operation and after removal of the cartilaginous tissue reduced to pieces of 2 mm. They were kept at +4°C in the synthetic culture medium no. 199 [Abstracter's note: culture medium not stated] for 24 hr. The complete decomposition of the tissue into individual cells (fibroblasts) was achieved by treating them with trypsin (0.25 % solution) in a magnetic mixer. Every 20-30 min the cell suspension was put into a centrifugal separator and centrifuged for 8 min at 1500 rpm. The separated cells were resuspended in culture medium no. 199 by adding 10 % human blood-serum, so that the final concentration of the cells amounted to 300,000 per ml of medium. 2 sterile penicillin flasks with glass covers containing 2 ml each were put into a thermostat at 37°C. 48 hr after inoculation the culture was irradiated with a single dose of 10, 25 and 50 r, respectively, by means of an УРПН-70-1 (URPN-70-1) X-ray apparatus. Then, the medium was exchanged, and after 36 hr (84 hr after the beginning of growth) it was fixed,

dyed, and enclosed in Canada balsam. Each test included a control series. Quantitative recording of chromosome mutations is difficult. The best material for this purpose are cells undergoing their first mitosis after irradiation. It is, however, not easy to find them in a mass culture. The beginning of mitosis is delayed by irradiation more or less, depending on the extent of cell lesion. The best time for observation is 42-49 hr after irradiation. With small radiation doses, chromosome fractures occur according to the so-called single hitting mechanism, since two chromosome fractures in one nucleus will rarely occur under these conditions. Beginning modifications of chromosomes were observed in the interphase and prophase. Fragments of chromatine, isochromatine bridges and fragments are formed. If fragments are lost, the cells possibly contain only bridges. For calculating the dependence of chromosome modifications on the dose, the influence of natural mutations has to be eliminated. Their frequency is 1.5 %. The authors calculated the frequency of induced mutations: 1.2 % for 10 r, 5.7 % for 25 r, and 11.8 % for 50 r. It does not differ much per r for all doses. From the results it is concluded that human nuclei are far more sensitive to radiation as has been presumed up to the present. A dose of 10 r thus effected a duplication of natural

mutations. Test no. 2. The test was repeated in a better medium: lactalbumin hydrolyzate in Khenks' solution and admixtures of blood-serum (20 %) and egg albumin (5 %). Results similar to those of test no. 1 were obtained in test no. 2 for doses of 5, 7, and 10 r. The authors presume that the total number of mutations of the gene structures effected by irradiation is much greater than that recorded by themselves. The interpretation by N. P. Dubinin (Ref. 6: Izv. AN SSSR, ser. biol., No. 6 (1957); Ref. 7: DAN, 122, No. 4 (1958); Ref. 8: Sborn. Sovetskiye uchenyye ob atomnoy opasnosti) with regard to the effect of a dose of 10 r was, however, confirmed within the range of the test. This dose might, however, be far less (3.5 r according to Ref. 2). Finally, it is stated that smaller doses of ionizing radiation (beginning from fractions of r) might endanger future generations. Moreover, they are able to cause malignant tumors. Therefore, the uncontrollable and ever-increasing effect of radioactive contamination due to nuclear tests cannot be tolerated. There are 3 tables and 8 references: 3 Soviet-bloc and 5 non-Soviet-bloc. Two references to English-language publications are given in the body of the abstract, the third one reads: T. T. Puck, P. I. Marcus (Ref. 5: J. Exp. Med., 103, No. 5, 653 (1956)).

25324 S/020/61/138/005/024/025
Experimental analysis of the influence... B103/B220

ASSOCIATION: Institut tsitologii i genetiki Sibirskogo otdeleniya Akademii nauk SSSR (Institute of Cytology and Genetics, Siberian Department of the Academy of Sciences USSR)

SUBMITTED: February 17, 1961

Card 5/5

DUBININ, N.P.; CHEREZHANOVA, L.V.

Antimutagenic and mutagenic effect of streptomycin. Dokl. AN SSSR 140 no.3:703-704 S '61. (MIRA 14:9)

1. Chlen-korrespondent AN SSSR (for Dubinin).
(PLANTS, EFFECT OF STREPTOMYCIN ON) (CHROMOSOMES)

ARSEN'YEVA, M.A.; DUBININ, N.P.; ORLOVA, N.N.; BAKULINA, E.D.

Radiation analysis of the duration of miotic phases in the spermatogenesis of monkeys (Macaca mulatta). Dokl. AN SSSR 141 no.6: 1486-1489 D '61. (MIRA 14:12)

1. Chlen-korrespondent AN SSSR (for Dubinin).
(SPERMATOGENESIS IN ANIMALS) (X RAYS--PHYSIOLOGICAL EFFECT)

42682

S/747/62/000/000/003/025
D268/D307

27 1220

AUTHORS: Dubinin, N. P., Kerkis, Yu. Ya. and Lebedeva, L. I.

TITLE: The effect of small doses of radiation on chromosome reorganization in the irradiation of cells in human embryonic tissue cultures

SOURCE: Radiatsionnaya genetika; sbornik rabot. Otd. biol. nauk AN SSSR. Moscow, Izd-vo AN SSSR, 1962, 39-49

TEXT: Chromosome reorganization was assessed by the rate of the appearance of bridges and fragments during mitosis in the anaphase and telophase in fibroplasts, in tissue cultures of 1 1/2 - 2 month-old human embryos irradiated with x rays (at 10, 25 and 50 r) 48 hours after initial culturing on medium no 199, as against that in similar cells by natural mutation. The rate of induced chromosome reorganization was 1.2, 5.7, and 11.8% for 10, 25, and 50 r respectively as against 1.5% in the control, showing that nuclei in human cells have much higher radiosensitivity than was believed. Average change was 0.15% at 1 r. Natural chromosome mutation, there-

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The effect of ...

fore, was doubled at 8 r. A second experiment with a different medium and irradiation at 5, 7 and 10 r showed chromosome reorganization doubling at 10 r, as against 1.2% for the control. Natural reorganization in the nuclei of nonirradiated fibroplasts was identical for the 2 media and the effects of small doses of x rays were similar. X rays at 8 - 10 r doubled the rate of natural structural mutations in chromosomes. The average number was 0.14% for 5, 7, 10, 25 and 50 r. There are 4 figures and 4 tables.

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR (Institute of Biological Physics AS USSR) and Institut tsitologii i genetiki SO AN SSSR (Institute of Cytology and Genetics, Siberian Branch, AS USSR, Novosibirsk)

S/747/62/000/000/018/025
D296/D307

AUTHOR: Dubinin, N. P.

TITLE: Control of the natural process of mutation

SOURCE: Radiatsionnaya genetika; sbornik rabot. Otd. biol. nauk AN SSSR. Moscow, Izd-vo AN SSSR, 1962, 279-286

TEXT: The article reviews Western and Soviet literature for the period 1917 - 1960, dealing with the problem of natural mutation as well as with ways of influencing this process in the sense of 1) deliberately increasing the number of mutations by means of the mutagenic effect of radiation, chemicals, drugs, etc.; 2) deliberate changes of the direction taken by the mutations; and 3) suppression of mutations (anti-mutagenic effect), emphasizing the great theoretical and practical importance of this latter problem. The author briefly describes his own experiments concerning the antimutagenic effect of streptomycin. This substance decreased the frequency of mutations in the chromosomes of Drosophila melanogaster by a factor of 4, and in the chromosomes of onion seedlings by a factor of almost 10.

~~Card 1/2~~ Inst Biological Physics AS USSR

DUBININ, N. P.

Correlation Between the Redox Potential of the Lymph of Crickets During Irradiation and Radiosensitivity

G. V. Samarskaya

4

A micromethod has been developed to determine the redox potential of the haemolymph of insects *in vivo*. The effect of various protective factors (hypoxia, protective substances) which influence the radiosensitivity of insects has been investigated.

Uncorrelated differences in the values of the redox potential have been observed for solutions of protective substances and for tissues into which protective substances had been introduced. On the other hand, when protective substances are introduced into the organism during hypoxia, the values of the redox potential exactly correlate with the magnitude of the protective effect and radiosensitivity. The data reported in the literature which failed to show such correlation were obtained when the potential was measured *in vitro* and did not allow for the redistribution of the rates of oxidation-reduction reactions in living systems, altered by the protective effects.

Lomonosov State University, Moscow, USSR

(d)

Direct and Indirect Radiation Damage to the Cell Nucleus

N. P. Dubinin, B. N. Sidorov and N. N. Sokolov

It is known that molecules in aqueous solution can undergo radiochemical reactions due to free radicals from the radiolysis of water, or by direct energy absorption.

The genetic effectiveness of free radicals produced chemically within the cell (Fenton reaction, reaction of ascorbic acid with hydrogen peroxide) allows us to assess the importance of the direct and indirect radiation effects on chromosomes. It was shown in plant cells (rootlets of *Allium fistulosum*) that substances which protect the chromosomes from the effect of the free radicals OH and HO_2 obtained chemically (K, KB, hyposulphite, etc.) are not protective when the chromosomes are irradiated with X-rays. We conclude that the genetic effect of radiation is due mainly to the direct effect and not to the products of water radiolysis.

Parallel experiments with DNA solutions (M. I. Mekshenkov) showed that the effectiveness of the direct action on DNA is much greater than that of the indirect effect.

The considerable protective ability of substances which protect chromosomes from free radicals was demonstrated in solutions of DNA only at low DNA concentrations. In solutions with high DNA concentrations the protective effect is virtually absent which points to the predominant rôle of the direct effect.

Institute of Biophysics, Academy of Sciences of the USSR, Moscow

report presented at the 2nd Intl. Congress of Radiation Research, Harrogate/Yorkshire, Gt. Brit. 5-11 Aug 1962

42695

S/747/62/000/000/019/025
D243/D307

27.2400

AUTHORS: Dubinin, N. P., Arsen'yeva, M. A., Kalyayeva, E. S., Ma Hsui-ch'uang and Wang Ang-ch'ih

TITLE: The protective effect of cysteamine (ß-mercaptoethylamine) on chromosome reorganization in the tissues of monkeys and mice

SOURCE: Radiatsionnaya genetika; sbornik rabot. Otd. biol. nauk AN SSSR. Moscow, Izd-vo AN SSSR, 1962, 287-299

TEXT: The effect of cysteamine in protecting from x ray damage bone marrow and germinal epithelial cell nuclei was studied at the first order spermatocyte stage in mice and monkeys (Macaca mulatta). 2 - 3 months old mice, 25 - 30 g in weight and of the Kuri-minsky line, were given 3 mg/150 mg/kg cysteamine intraabdominally, 10 minutes before irradiation with single doses of 200, 400 and 600 r, at 11.5 r/min. The mice were killed 1, 2, 5 and 10 days later and the testicles and a section of the femur were removed for analysis. Sexually mature, 6 - 8-year old monkeys received 3 mg/

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The protective effect ...

100 mg/kg cysteamine 10 minutes before irradiation with 200-r doses, were castrated 24 hours later, and a section of a rib was removed. Controls have the second testicle and a second rib removed on the 10th day. In mice, cysteamine protected the germinal epithelial and bone marrow cells to an average extent of 42.75 and 50.77% respectively, as compared with controls, and in monkeys, to 52.4 and 50.8%. The monkeys' germinal epithelial cells were much more radiosensitive than those of mice. The latter showed no difference in effect in pachytene and diplotene. The level of protection obtained in these experiments was exceptionally high, 50% as compared with the 30% obtained by Devik and Lothe. The two results are not, however, strictly comparable. Kimball's theory that radiation-protection is not linked solely to removal of the oxygen effect is supported. In both organs, cysteamine protects against chromosome reorganization but not against chromosome adhesion, which indicates that it acts by forming DNA-cysteamine complexes. There are 4 figures and 5 tables.

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The protective effect ... S/747/62/000/000/019/025
D243/D307

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DUBININ, N.P.; KANAVETS, O.L.

Space flight factors and primary nondisjunction of chromosomes.
Probl.kosm.biol. 1:252-257 '62. (MIRA 15:12)
(SPACE FLIGHT—PHYSIOLOGICAL EFFECT) (CHROMOSOMES)

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TITLE: Cytogenetic effect of ionizing radiation and of streptomycin

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 1, 1962, 208-210

TEXT: The interaction of streptomycin (concentration $5 \cdot 10^{-3}$ γ/mm) and of irradiation with: (a) γ-rays (250 r) or (b) fast neutrons (30 rad) in their combined action on the mutagenic process in various phases of the cell division cycle (CDC) was studied. Onion roots (Allium cepa) were used for the experiment. CDC for onions takes 20 hr, 2.5 hr being required for mitosis. In the case of irradiation, CDC takes 24 hr. The roots were treated with streptomycin (S) before and after irradiation. It was found that the prophase (2.4 hr) and the late interphase (9 hr) were most sensitive, whereas mean and early interphases (16, 29, and 24 hr) were most insensitive. Treatment with S, 2 and 1 hr before irradiation, showed a protective effect of totally 51% when irradiating the late interphase and prophase; but no protective effect was observed in the mean and late

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interphases. No protective effect of S was observed in the stages immediately after irradiation. It is still unknown whether S, in producing mutations, acts on the primary mechanisms at the time of irradiation, or only after irradiation as soon as the potentially varied chromosomes enter a stage sensitive to S. It was found that irradiation types (a) and (b) had the same effect when S was introduced after irradiation. While 20.9% of cells with chromosome reorganization were observed in a control (without S), these disturbances decreased considerably after introducing S (2 and 4 hr after irradiation) (12.7 and 10.0%). Protective effect was 48%. On the other hand, chromosome disturbances increased in a treatment with S (38.4; 30.0; 30.7%) when treated 9, 12, and 16 hr after irradiation. These results indicate both a protective and sensibilizing effect of S. In the case of (b), this transition from the protective effect to sensibilization was even more distinct. S introduced after irradiation protects in the early interphase, and sensibilizes in the late interphase and prophase. S introduced prior to irradiation protects in the late interphase and in the prophase, no sensibilization being observed in the other phases. This is explained by the fact that the protective effect of S is not connected with a certain stage of CDC but with the lifetime

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of the potential chromosome variations. Protection is only possible shortly after irradiation, i.e., while chromosome variations appear. Potential variations have a long lifetime. The absence of sensibilization, when introducing S prior to irradiation, may be attributed to the fact that S protects shortly after irradiation whereas it sensibilizes later on. Thus, the two modes of action cancel each other. There are 2 tables and 8 references: 2 Soviet and 6 non-Soviet. The four most recent references to English-language publications read as follows: D. Winber, Am. J. Bot., 47, 828 (1960); R. F. Kimball, N. Gaither, Genetics, 42, 5, 661 (1957); R. F. Kimball, N. Gaither, S. M. Wilson, Rad. Res., 10, 490 (1959); W. Umbrecht, J. Biol. Chem., 177, 703 (1949).

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DUBININ, N.P.; CHEREZHANOVA, L.V.; BULOCHNIKOVA, Ye.K.

Control of mutation processes in cancerous cells.
Dokl. AN SSSR 146 no.4:917-920 O '62. (MIRA 15:11)

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(VARIATION (BIOLOGY))
(CANCER) (STREPTOMYCIN)

DUBININ, N. P.,

"Cytogenetic Radiosensitivity of Various Phases of Nuclear Cycle of Human Cells in Tissue Cultures."

"The Problem of Antimutagens in Connection with Mutagenesis and Chemical Protection."

report submitted for the 11th Intl. Congress of Genetics, The Hague, Netherlands, 2-10 Sep 63

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[Molecular genetics and the effect of irradiation on heredity] Molekuliarnaia genetika i deistvie izluchenii na nasledstvennost'. Moskva, Gosatomizdat, 1963. 238 p. (MIRA 16:5)
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(Actinomyces)